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AUTHOR Shore, Cecilia
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ABSTRACT

The purposes of this study were to investigate (1) the level of development of four target vocal and gestural symbols (Doggie, Cup, Car, and Fiffin, a novel concept), and (2) the relationship of symbolic maturity to the use of symbols in combinations. Thirty infants (15 boys and 15 girls), between 82 and 91 weeks of age, were observed for approximately 45 minutes in a laboratory playroom setting. During the sessions a number of tasks were administered which were designed to assess the children's use of words and conventional gestures, as well as their ability to combine words and gestures. For each target concept, four potential exemplars were presented: a realistic exemplar, an "unusual" exemplar, a perceptually similar member of the same superordinate category, and an object often found with the target object, or related by contiguity. A total of 16 trials were ordered semi-randomly so that no two objects from the same category or level of membership were presented together. The child's utterances during these and other interactions with the experimenter were transcribed. The data were used to obtain several measures of multiword use, including the longest utterance in different content words, the mean length of utterance (MLU) in content words on the five longest utterances, and MLU in morphemes on the five longest utterances. The children's play and language were transcribed by two independent coders. Only actions and utterances agreed upon by both coders were entered into analyses. Results are discussed. (Author/RH)

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Conceptual Development and Early Multiword Speech

Cecilia Shore
Department of Psychology, Miami University
Oxford, OH 45056

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Although children tend to produce their first words near the end of the first year, early sentences do not appear until around 18-24 months. This gap in time is particularly intriguing, given the rapidity with which children acquire their native language after that point. The child seems to be waiting for something -- but for what?

Near the onset of multiword speech, changes in the use of language suggest that changes in the semantic/conceptual system may contribute to early word combinations. First, there seems to be a sudden increase in vocabulary accompanied by an interest in the names of things, as exemplified by the question "Whassat?" Piaget (1962) and Nelson (1974) suggest that the interest in the names of things shows a growing awareness of the object as a member of a class. Secondly, the child begins to evidence the ability to talk about objects in their absence (Ingram, 1978). Such semantic/conceptual development is thought to reveal the development of symbols -- their freedom from particular exemplars and the need for perceptual support. Symbolic development is believed to be important for the ability to combine symbols into early sentences (Nelson, 1974; Piaget, 1962; Werner & Kaplan, 1963).

The purpose of this study was to investigate the level of development of four target vocal and gestural symbols and the relationship of symbolic maturity to the use of symbols in combinations.

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Procedure

Subjects

Thirty subjects between 82-91 weeks, 15 boys and 15 girls, were observed in a laboratory playroom setting. The sessions lasted approximately 45 minutes. During the sessions, a number of tasks were administered which were designed to assess the children's use of words and conventional gestures, as well as their ability to combine words and gestures.

Tasks

Range of extension task. In this task, four target concepts were selected: doggie, cup, car and fiffin (a novel concept, after Nelson & Bonvillian, 1978; Nelson & Nelson, 1978). A picture of the fiffin can be seen in Figure 1. "Doggie" and "Car" are frequently among children's first 50 words, cup less often so (Nelson, 1973). For each target concept, four potential exemplars were presented: a realistic exemplar, a perceptually similar member of the same superordinate category, and an object often found with the target object, or related by contiguity (Anglin, 1977). This made a total of 16 trials. These were ordered semi-randomly, so that no two objects from the same category or level of membership were presented together. On each trial, E presented the child with the object, and prompted the child to gesture or name it -- "Oooh what's that? What can you do with that?" E then modeled the name and a conventional action with the object, e.g., hugging the doggie items, and encouraged the child to imitate: "Is that a doggie? Can you say 'doggie'? Look what I can do! Can you do that?" A similar task is described by Kuczaj (Note 1). The child was scored 1,0 on each trial for saying the name or carrying out the conventional action. Table 1 summarizes the task.

Presentational dependency task. On each of four trials, E held up one of the target objects (doggie, cup, car and fiffin) so that the child could

see it. Then E hid the object in a box so that it was no longer visible, and tried to get the child to say the name of the object. The child was scored 1,0 on each trial for naming the absent object.

Symbolic play combinations. For each of the four objects there were two trials, one involving an appropriate exemplar of the concept, and one involving an inappropriate object with some other function. A scenario of three actions was carried out on each trial, e.g., pour in the cup, drink from the cup, set the cup on the saucer. The children were scored on each trial for the greatest number of actions strung together without interrupting the number of different actions they put together in a sequence without interruption, and for the number of pairs of action in the modeled order, regardless of whether they were in the same segment. Table 2 summarizes the symbolic play task.

Language measures. The child's utterances during these and other interactions with the experimenter were transcribed. The corpora were used to obtain several measures of multiword use, including the longest utterance in different content words, MLU in content words on the five longest utterances, & MLU in morphemes on the five longest utterances.

Videotape coding

The children's play and language were transcribed by two independent coders. Only actions and utterances agreed upon by both coders were entered into analyses.

Results

Descriptive statistics

Range of extension task -- vocal. Children tended to name more objects after modeling than before, but this difference did not reach significance: $t(26)=2.02$, $p=.054$. Children named more potential doggies than other concepts

both spontaneously [$F(3,87)=3.83$, $p < .02$] and after modeling [$F(3,87)=2.87$, $p < .05$]. However, level of membership (real, close, distant, contiguity) did not make a difference in whether the children named those exemplars. Table 3 summarizes these data.

Spontaneous naming was correlated with elicited naming for the natural concepts, but not the fiffin [Doggie $r(28)=.71$, $p < .001$; Cup $r(28)=.42$, $p < .03$; Car $r(28)=.39$, $p < .047$]. In addition, spontaneous to elicited correlations were observed for real and close exemplars [real $r(28)=.53$, $p < .002$; close $r(28)=.52$, $p < .004$], but not for distant or contiguity items. This before-after correspondence for some items but not others suggests that elicited naming of novel objects or unusual exemplars is somehow different from the normal naming that children at this age engage in frequently.

Range of extension --gestural. Children gave the conventional gesture to fewer items before modeling than after modeling [$t(26)=5.37$, $p < .001$]. There were significant differences among objects in the proportion of exemplars to which the conventional gesture was extended: Spontaneous $F(3.87)=22.82$, $p < .001$; Elicited $f(3.87)=7.74$, $p < .001$. Table 4 summarizes these data.

There were also significant differences among levels of membership in the proportion of exemplars with which the child did the gesture: Spontaneous $F(3.87)=14.19$, $p<.001$; Elicited $F(3.87)=3.12$, $p < .04$. Spontaneously, children were least likely to carry out the conventional action with the contiguity object, and after modeling were most likely to imitate the action with the closely related object. This is reasonable: children are not likely, for example, to hug a leash without somebody suggesting it to them. Gestures seem to be more tied to the function of the object than words--it is less easy in gesture to differentiate a reference to the thing from what you do with it. With words, you can say "this reminds me of x" without also suggesting that you do the same thing with it.

A similar pattern of spontaneous to elicited performance occurred in this task as in the vocal data. Again, spontaneous to elicited correlations were observed for all the familiar objects, but not the fiffin: Doggie $r(28)=.39$, $p < .04$; cup $r(28)=.40$, $p < .03$; car $r(28).56$, $p < .001$. By level of membership, spontaneous to elicited correlations were observed only for the real objects [$r(28)=.56$, $p < .001$.] Again, this pattern is suggestive of a difference between ordinary recognitory gestures and those elicited for novel objects or unusual exemplars.

Between task correlations. The mean number of objects which were gestured with (4.15) was greater than the mean number of objects which were vocally labelled (1.93), $t(26)=5.15$, $p < .001$. This difference is consistent with a growing literature to suggest that symbols are somehow easier in the gestural modality.

The only cross-modality relationship to be significant was spontaneous labeling to elicited gesture [$r(28)=.49$, $p < .01$.] This curious relationship holds up also for individual objects, as can be seen in Table 5. One possible interpretation is that children who tend to give a verbal label for the object right away may need to be reminded by modeling that there is another way to "tag" the object.

Range of extension task and multiword performance. The number of different objects which the child labeled in the extension task was correlated with upper-bound measures of multiword performance, as can be seen in Table 6. However, when the relationships are broken down by particular objects, i.e., "Are children who broadly extend "doggie" likely to use "doggie" in a multiword utterance?", the only such relationship to be significant was fiffin extension with the use of fiffin in a multiword utterance $r(28)=.56$, $p < .001$.

Range of gestural extension and symbolic play. No relationships were observed between gestural extension and symbolic play combinations. When the analyses were carried out for individual objects, two correlations were observed between the extension of rolling to a variety of "cars" and symbolic play combinations involving cars, but a number of correlations were observed between glooping a variety of fiffins and the complexity of symbolic play in fiffin scenes. Table 7 summarizes these correlations.

These results must be interpreted with caution, for the mean number of fiffins to which the children extended the name or gesture was quite low, and these correlations may represent floor effects. However, it is tantalizing to think that only early on in the acquisition of a concept can a relationship be observed between conceptual breadth and combinatorial usage.

Presentational dependency. The children very seldom said the name of the object in its absence -- any given child said the name of at most one absent object in this task. However, the presence or absence of such usage was related to the total number of objects to which the child extended the target name in the extension task: spontaneous $r(25)=.51$, $p < .003$, elicited $r(25)=.37$, $p < .03$. Furthermore, the use of the name of an absent object was also related to the same multiword measures as total range of extension, as can be seen in Table 6. It seems unlikely that these correlations represent floor effects, since they make sense in light of the range of extension task.

Summary

These data can be used as support for the following:

1. Off-the cuff, spontaneous naming of familiar exemplars of objects seems to be different than elicited naming of unusual exemplars or novel objects.

2. Gestural symbols, on the whole, are more frequently produced than vocal symbols. However, spontaneous vocal naming is related to the production of elicited gestural symbols, suggesting that children who spontaneously label an object vocally may have to be cued to also give a conventional gesture.

3. Range of extension in the vocal modality was correlated with some measures of multiword performance across objects. This was not the case for gestural extension and symbolic play combinations. By individual objects, the majority of relationships were observed for the novel concept. This, taken with the observation that spontaneous and elicited naming of the fiffin were not correlated, suggest that early in the acquisition of a concept, conscious and deliberate naming may be indicative of the readiness for combinatorial use of the symbol.

4. The use of a word in the absence of an object was related to, and showed the same pattern of correlations as, vocal extension. This suggests that both of these measures may be getting at a similar capability, such as conceptual maturity.

Reference Notes

1. Kuczaj, S. Young children's over-extensions of object words in comprehension and/or production: Support for a prototype theory of early object word meaning. Paper presented to the Society for Research in Child Development, San Francisco, March 1979.

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Table 1

Levels of Membership

Real	Close	Distant	Contiguity
Doggie	Donkey	Woodstock	Leash
Cup	Glass	Bowl	Pitcher
Car	Bus/Van	Airplane	Steering Wheel
Fiffin	"Abstract" fiffin	Beanbag fiffin	Tube + bolt Object

Potential exemplars for each of four concepts used in Range of extension task. On each trial child scored yes-no for target word and conventional gesture.

Table 2

Appropriate	Inappropriate
DOGGIE Leash Bowl	FLASHLIGHT Leash Bowl
Doggie scene: Put the leash on the doggie, hug doggie, make doggie eat from bowl	
CUP Pitcher Saucer	COMB Pitcher Saucer
Cup scene: pour into the cup, drink from cup, set cup on saucer	
CAR Doll Gas station	BEAD NECKLACE Doll Gas station
Car scene: put doll in car, drive car, get gas in car	
FIFFIN fuzzy crook tube + bolt object	SHOE fuzzy crook tube + bolt object
Fiffin scene: get fiffin with crook, "gloop" fiffin, touch fiffin to tube + bolt object	

Symbolic Play scenes, administered in semi-random order. For each trial, C scored on # of different actions put together without interruption, and number of pairs of actions in modelled order.

Table 3

Proportion of Exemplars to Which Label Was Applied

By Object	Mean	S	Range
Doggie			
sp.	0.21	0.21	0-0.75
el.	0.28	0.36	0-1
Cup			
sp.	0.10	0.19	0-0.75
el.	0.18	0.26	0-0.75
Car			
sp.	0.08	0.14	0-0.5
el.	0.15	0.21	0-0.5
Fiffin			
sp.	0.08	0.19	0-0.75
el.	0.15	0.28	0-1
By Level of Class Membership	**Mean**	**S**	**Range**
Real			
sp.	0.18	0.22	0-0.75
el.	0.17	0.22	0-0.75
Close			
sp.	0.12	0.16	0-0.5
el.	0.18	0.25	0-0.75
Distant			
sp.	0.08	0.16	0-0.75
el.	0.21	0.27	0-1
Contiguous			
sp.	0.09	0.14	0-0.5
el.	0.21	0.28	0-1

Table 4

Proportion of Exemplars to Which Gesture was Applied

By Objects	Mean	S	Range
Doggie			
sp.	0.18	0.19	0-0.5
el.	0.40	0.38	0-1
Cup			
sp.	0.24	0.22	0-0.75
el.	0.54	0.32	0-1
Car			
sp.	0.51	0.26	0-0.75
el.	0.65	0.31	0-1
Fiffin			
sp.	0.09	0.14	0-0.5
el.	0.42	0.38	0-1
By Level of Class Membership	**Mean**	**S**	**Range**
Real			
sp.	0.33	0.27	0-0.75
el.	0.47	0.33	0-1
Close			
sp.	0.40	0.22	0-1
el.	0.61	0.33	0-1
Distant			
sp.	0.24	0.17	0-0.75
el.	0.51	0.33	0-1
Contiguous			
sp.	0.06	0.13	0-0.5
el.	0.42	0.32	0-1

Table 5

Correlations Among Gestural and Vocal Extension
(by Object Class)

		Vocal	
		Spontaneous	Elicited
Doggie			
Gestural	sp.	.01	-.23
	el.	.42*	.08
Cup			
Gestural	sp.	.07	-.12
	el.	.38*	.06
Car			
Gestural	sp.	.09	.11
	el.	-.14	-.07
Fiffin			
Gestural	sp.	-.14	.14
	el.	.41*	.29
Total			
Gestural	sp.	.15	-.14
	el.	.49**	.15

*p < .05.

**p < .01.

Table 6

Correlations between word use flexibility and multi-word usage

	MLU 5 longest utts. content words	MLU 5 longest utts. morphemes	Longest utterance in diff. content words
Total # of objects named			
Spont.	.50*	.43*	.60*
Elicited	.42*	.61*	.44*
Naming absent object	.62*	.52*	.61*

Table 7

Range of gestural extension and symbolic play combinations.

Symbolic play	Range of extension	
	Spontaneous	Elicited
Car		
Appropriate		
# schemes in segment		
# dif. schemes in segment		
# pairs in order		
Inappropriate		
# schemes in segment		
# dif. schemes in segment		.37*
# pairs in order		.37*
Fiffin		
Appropriate		
# schemes in segment	.46**	
# dif. schemes in segment	.54**	
# pairs in order		
Inappropriate		
# schemes in segment	.38*	
# dif. schemes in segment		.51**
# pairs in order		

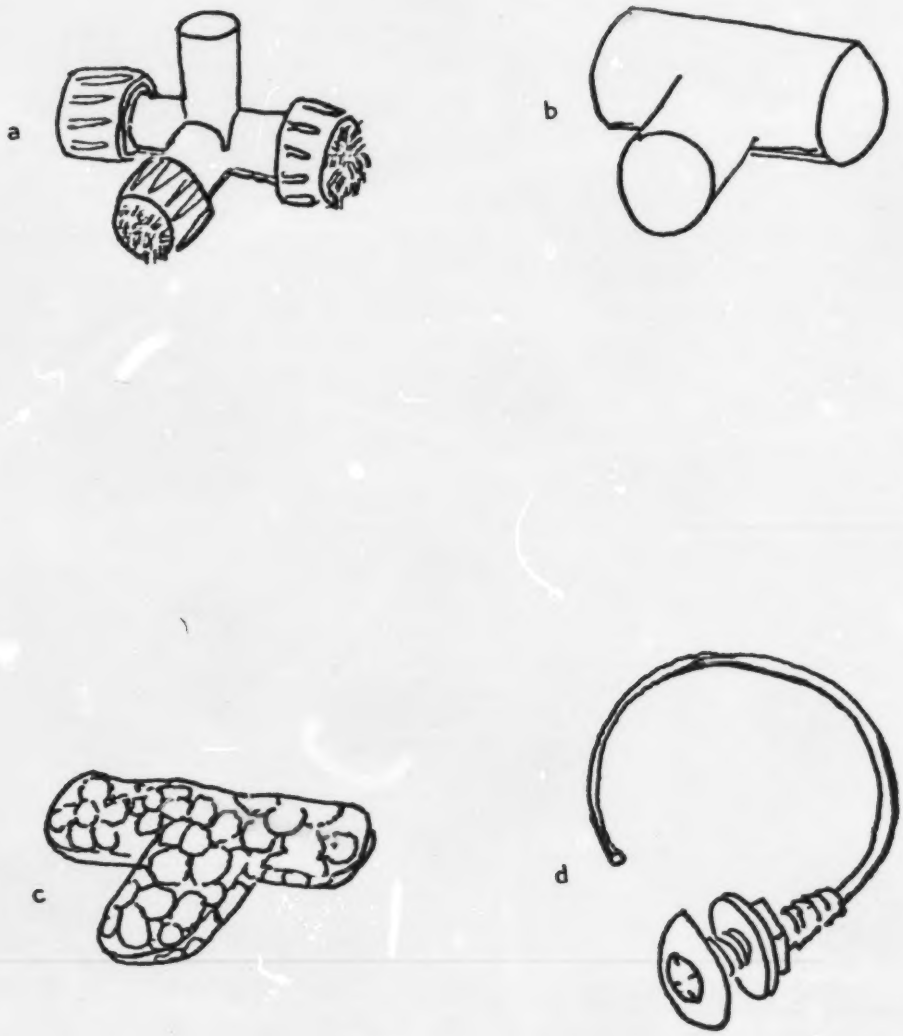

Figure 1. Novel objects: a) fiffin, b) "abstract" fiffin, c) beanbag fiffin, d) tube and bolt object.